Submission on National Water Reform 2020, Draft Report

by

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Table of Contents

List of acronyms and terms

ABS	Australian Bureau of Statistics
ASNA	Australian System of National Accounts
AWAS	Australian Water Accounting Standards
BoM	Bureau of Meteorology
Draft Report	Productivity Commission, National Water Reform 2020, Draft Report.
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999
GDP	Gross domestic product
GVIAP	Gross value of irrigated agricultural production
IVA	Industry value added
NWI	National Water Initiative 2004
MDB	Murray Darling Basin (also the Basin)
MDBA	Murray Darling Basin Authority
MDBP	Murray Darling Basin Plan (also the Plan)
SEEA	System of Environmental-Economic Accounting
SNA	System of National Accounts
The Act	Water Act 2007
UN	United Nations

1. Scope of submission and key points

This submission addresses the information requirements of the Water Act 2007 (the Act) as outlined in Part 7 of the Act and with reference to both the Object of the Act and the National Water Initiative 2004 (NWI).

The National Water Reform 2020, Draft Report (Draft Report) notes that "…water accounting is generally providing practical, credible and reliable information…" (p. 1). Furthermore, the summary of Draft NWI Renewal Advice states the need to "significantly enhance the environmental management and water accounting (system integrity) elements" [of the NWI] (p. 13). The advice is expanded upon in Section 3.5 of the Draft Report and the Draft NWI Renewal Advice (Draft Advice) numbers 10.1 to 10.4. This Draft Advice on water accounting is fully supported.

This submission details the enhancements to water accounting and its integration with other information that could be made in order to better meet the Objectives of the Act, and in particular Objectives c, d(ii) and d(iii), (f), (g) and (h). The information needed to meet these Objectives extends beyond water information as defined in paragraph 125 of the Act and the water accounting currently done by the Australian Bureau of Statistics (ABS) and Bureau of Meteorology (BoM).

The additional information and information integration requirements needed to meet the Object of the Act could be met by:

- Integration of the ABS and BoM water accounts
- Integration of water accounts with other information on the environment and economy via the use of the international statistical standard the System of Environmental-Economic Accounting (SEEA)
- A process to ensure the needs of information users are addressed by the suppliers of information and accounts

A set of SEEA accounts would help:

- Maximise the economic, social and environmental benefits of water use in Australia
- Integrate water policy with other policies (e.g. agriculture, forestry and land use planning) and plan for the impacts of climate change on water availability
- The Murray Darling Basin Authority (MDBA) in the implementation and review of the Murray Darling Basin Plan (MDBP)
- Ensure cost-effective provision of water to rural communities
- Justify government investments in water infrastructure and the maintenance of ecosystems

Integration of information by accounting may also be of broader use. For example, to those seeking to understand the relative importance of water resources to economic production and national wealth as well as maintaining healthy ecosystems outside of the scope of the Act, such as in accordance with international obligations and related legislation: the Environmental Protect and Biodiversity Conservation Act 1999 (EPBC Act).

This information in this submission could be used to expand on the Draft NWI Renewal Advice numbers 10.1 to 10.4 of the Draft Report, and incorporated in final advice and supporting text of the final report. This could also include advice to update the Act and related Regulations on the nature and scope of water accounting and its integration with other environmental and economic information.

The submission also contains some background material, much of which will be known to the Commissioners. It is provided for context and so that the submission may "stand alone" and be understood, at least in general, by others with an interest in the Act and the review of the NWI.

2. Water accounting

Water accounting is, as noted in the Draft Report (p. 122), one of the objectives of the NWI. In this water accounts were intended to meet multiple information needs.

The National Water Initiative (NWI) recognised this and in particular the Parties agreed that:

> … the outcome of water resource accounting is to ensure that adequate measurement, monitoring and reporting systems are in place in all jurisdictions, to support public and investor confidence in the amount of water being traded, extracted for consumptive use, and recovered and managed for *environmental and other public benefit outcomes*.[1]

The international statistical standard for water accounting is SEEA. The SEEA has several components: the SEEA Water (UN et al. 2012), SEEA Central Framework (UN et al. 2014a), and SEEA Ecosystem Accounting (UN et al. 2021)[2]. These standards were adopted by the United Nations in Statistical Commission in 2007, 2012 and 2021 respectively. The SEEA accounts provide an integrated framework for relating environment and economic information and, in particular, to the System of National Accounts (SNA) (EC et al. 2009), which is also an international statistical standard. More on the SEEA is outlined in Section 3. The various components of the SEEA have many types of accounts. The SEEA-Water alone has 16 different types of water accounts.

The Australian Water Accounting Standards (AWAS) (Water Accounting Standard Board 2014) were developed by the BoM as a result of the Water Act and associated regulations.[3]

There has been confusion among stakeholders about the accounts produced by the BoM and ABS (e.g. Commonwealth of Australia 2014, p. 92). This is due to misunderstandings and the little attempt to explain the type, scope, coverage and uses of these two accounts to different stakeholders.

The types of water accounts produced by BoM and ABS are different. The BoM National Water Account (e.g. BoM 2020) is based on the AWAS and is equivalent to a SEEA asset account (Vardon et al. 2012). Asset accounts show the opening and closing stocks of water assets and the additions and subtractions to those assets according to human or natural causes. The ABS Water Account, Australia (e.g. ABS 2020b) are supply-use accounts as defined in the SEEA. They show the extraction of water from the environment (including dams) and its supply and use by different industries and households. This information can be directed related to the information from the SNA, including industry value added (IVA).

The BoM and ABS water accounts are also different in scope and coverage. In 2020, the BoM accounts were for 11 regions of Australia – Burdekin, Daly, Ord, Fitzroy, Adelaide, Canberra, Melbourne, Perth, South East Queensland, Sydney and the Murray Darling Basin (MDB) – and measured in physical terms (e.g. in megalitres), while the ABS accounts cover all of Australia, with state and territory breakdowns, and are measured in physical and monetary terms. Both accounts are based on the financial year and are produced annually. The ABS accounts date back to 1993-94 until 2018-19 with gaps in the times series but annual from 2008-09. The BoM accounts are from 2009-10 to 2018-19. The ABS accounts have previously included information on water access entitlements and allocations and temporary and permanent water trades. This information was last included in the ABS accounts in 2006, with respect to the 2004-05 financial year. The

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[1] NWI paragraph 80.

[2] I was a contributor to the SEEA-Water , a member of the Editorial Boards of the SEEA-Central Framework as well as the SEEA-Experimental Ecosystem Accounting (UN et al 2014b) , which preceded the SEEA-EA (of which I was reviewer)

[3] https://www.legislation.gov.au/Series/F2008L02170

BoM and ABS have worked together to provide an integrate asset and supply-use use accounts in physical and monetary terms for the Canberra region for the years 2013-14 to 2016-17 (ABS and BoM 2018).

The water accounting done by the BoM is mandated by the Act (paras. 120-123). The water accounts prepared by the ABS are done at the discretion of the Australian Statistician under the Census and Statistics Act 1905. Both agencies collect and publish information using their mandates and both are obliged to keep the information provided confidential (i.e. the information must be aggregated to prevent the identification of individual data providers).

To fully meet the Object of the Water Act 2007, the scope of improvements to water accounts goes beyond the needs to:

- "secure the interests Aboriginal and Torres Strait Islander people in water resource management" and "to include principles for efficient investments in major water infrastructure" (Draft Report, p. 41).
- "ensure the provision of credible and reliable information and institutional processes that provide assurance that: entitlement holders are operating in line with their rights and water use is consistent with established rights and plans water resource systems are being managed to best effect for all users. (Draft Report, p.121)"

This is because of the Objectives of the Act. How accounting can help advance particular Objectives of the Act is explained in Section 4 of this submission. Before getting to this explanation, a broader description of SEEA is provided in Section 3.

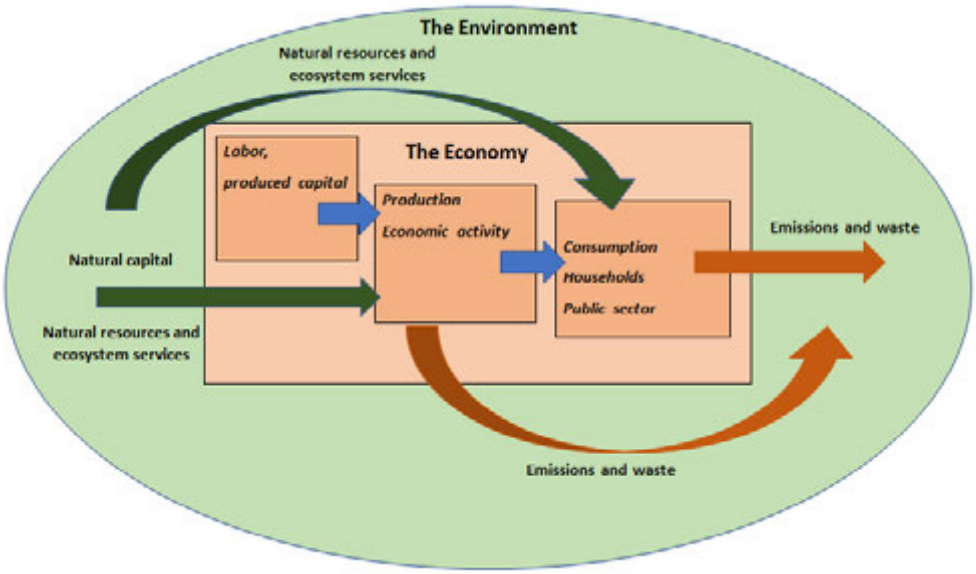
3. System of Environmental-Economic Accounting (SEEA)

The SEEA provides a framework for information on the world's stock of natural assets which includes: air, water, soil, mineral resources and all living things – the world's "natural capital" – and the complex interactions which occur between the component parts. Natural capital provides us with natural resources such as water, minerals, and timber, as well as flows of ecosystem services, such as pollination, water filtration, flood control, climate regulation, erosion control, and cultural and recreational services.

The SEEA provides a framework for measuring and valuing natural capital and the ecosystem services that come from them. It does this in a consistent way over time and space and establishes links between the environment and economy and in particular to the System of National Accounts (SNA), the system which gives us the metric GDP (Gross Domestic Product).

The well-established SNA captures the flows of produced goods and services in monetary terms, represented by the rectangles and blue arrows in Figure 1. The SEEA complements the SNA by providing data on natural resources and ecosystem services that contribute to economic production and human well-being (the green arrows), as well as the emissions and waste that result from production and consumption (the brown arrows).

Figure 1. The environmental and economic context for NCA

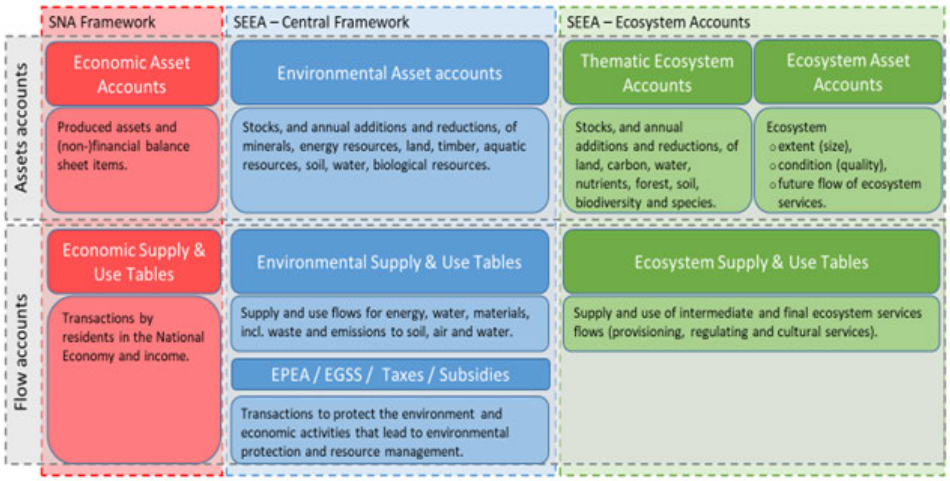


Integrating data on economic activities and the environment via accounting provides regular systematic information enabling the current situation to be understood and represented by the best available data and understanding of the interrelations of the economy and environment. It also provides a platform modelling and the analysis of different scenarios. For example, how economic activity depletes, through extraction of natural resources, or degrades, via pollution, natural capital. This extends more generally to how the economy, and human well-being more generally, is dependent on the ecosystem services that flow from the natural capital. Such information can inform resource management, such as water and the land (e.g. the ecosystems and activity that occur within the Murray-Darling Basin).

Without a coherent measurement framework, resource managers cannot determine if legal instruments (e.g. the Act) or policy decisions increase, maintain or deplete natural capital – and hence its potential to grow economic prosperity – or the associated changes in ecosystem services that could eventually undermine prosperity.

The SNA, SEEA Central Framework and the SEEA Ecosystem Accounting together provide a coherent, internationally agreed concepts and methods for producing a suite of accounts that can aid natural resource management. An overview of the accounts is shown in Figure 2.

Figure 2. Main types of accounts in the SNA and SEEA



The point of SEEA is not simply to construct accounts: it is to use them to inform decisions (Vardon et al. 2016). It is clear that decisions needing to make trade-offs between maintaining natural capital and achieving economic growth and employment targets are complex. The many problems of natural capital scarcity, maldistribution, and ecological limits are on the rise and highlighted through international agreements such as the UN Framework Convention on Climate Change (UNFCCC)[4], the Convention on Biological Diversity (CBD)[5] and the Ramsar Convention[6]. Australia's obligations under the CBD and Ramsar Conventions are met through various parts of the EPBC and Water Acts.

4 How extended accounting can meet the Objectives of the Water Act 2007

Information integrated via SEEA can benefit the implementation and review of the success of the Act in meeting the Object of the Act. To do this each of the Objectives of the Act are addressed in turn, outlining the types of accounts that could assist and examples of how the information from the accounts could be applied.

The Annex provides an overview of how water policy in general may be addressed via water and ecosystem account.

Objective (a)

> "to enable the Commonwealth, in conjunction with the Basin States, to manage the Basin water resources in the national interest"

The term "national interest" is not defined in the Act. Assuming that the "national interest" relates to achieving a balance of national social, economic and environmental goals, the accounts are able to integrate

[4] UNFCCC https://unfccc.int/

[5] CBD https://www.cbd.int/

[6] Ramsar Convention https://www.ramsar.org/

a range of economic and environmental information to test the attainment of goals (as articulated through policy) and reveal historical trade-offs between goals.

Objective (b)

> "to give effect to relevant international agreements (to the extent to which those agreements are relevant to the use and management of the Basin water resources) and, in particular, to provide for special measures, in accordance with those agreements, to address the threats to the Basin water resources"

Accounts of ecosystem extent and condition in physical terms can be used to monitor the degree to which international obligations to protect and manage particular sites (e.g. Ramsar Wetlands) or particular species and ecosystems (e.g. according to obligations under the Convention on Biological Diversity) are met. Accounts in physical terms for ecosystem services related to climate regulation (carbon storage and carbon sequestration) could also be used to meet help achieve obligations under the UN Framework Convention on Climate Change.

Objective (c)

> ". . .to promote the use and management of the Basin water resources in a way that optimises economic, social and environmental outcomes"

The accounts which could aid the achievement of Objective (c) are similar to those that would support Objective (d)(iii) and are discussed below under that Objective.

Objective (d)(i)

> "to ensure the return to environmentally sustainable levels of extraction for water resources that are overallocated or overused"

Environmental-economic accounting would play a monitoring role in achieving this Objective. The accounts would not set the environmentally sustainable levels of extraction for water but they could be used to monitor both the levels of extraction and the extent and condition of ecosystems. With such information those responsible with setting the levels could revise the environmentally sustainable level up or down as required, while those responsible for managing the water resources and specific ecosystem assets (e.g. Ramsar wetlands) could evaluate the effectiveness of management.

Objective (d)(ii)

> "to protect, restore and provide for the ecological values and ecosystem services of the Murray Darling Basin (taking into account, in particular, the impact that the taking of water has on the watercourses, lakes, wetlands, ground water and water dependent ecosystems that are part of the Basin water resources and on associated biodiversity)"

Accounts for ecosystem extent, ecosystem condition and ecosystem services could play a significant role in monitoring the achievement of this Objective. The information from the accounts could also be used identify ecosystem assets (i.e. watercourses, lakes, wetlands, ground water and water dependent ecosystems, biodiversity) in need of additional protection or restoration measures as well as those in adequate or above adequate condition, hence indicating where water can be redirected to areas or ecosystems in greater need of protection. The would include Ramsar Wetlands and species and ecological communities that depend on water. For example, the River Murray and associated wetlands, floodplains and groundwater systems, from the junction with the Darling River to the sea (TSSC 2013).

Objective (d)(iii)

> "subject to subparagraphs (i) and (ii)—to maximise the net economic returns to the Australian community from the use and management of the Basin water resources"

Maximising net economic returns could be taken in two contexts. First, in the economic analysis of individual industries (e.g. agriculture, water supply, mining, etc.) net contributions to the economy, and second, the net benefits across the economy to water producers and water consumers, both intermediate (e.g. agriculture) and final (households). SEEA accounts can assist with both interpretations.

Taking the first interpretation, it is noted that Figure 12.1 of the Draft Report uses physical information on the supply and use of water in combination information on gross value of irrigated agricultural production (GVIAP), both from the ABS Water Account Australia, to provide an indication of productivity of water use. Cobbold (2003) notes that gross and net measures of production are in general aligned but can be different within industries.

The industry value added of agriculture from the Australian System of National Accounts (ASNA) (e.g. ABS 2020a), which is a net measure, is not used in the Draft Report. The ABS does not provide industry value added (IVA) split by irrigated or non-irrigated agriculture in the ASNA which is published annually. This could be estimated roughly (i.e. "a back of the envelope calculation") by comparing the gross value of irrigated agricultural production with the gross value of agricultural production (GVAP). For example, in 2018-18, GVIAP was $16.4 billion and GVAP was $60.4 billion (including livestock production of $9.6 billion), while IVA for agriculture was $41.4 billion, hence a very rough estimate would be $13.4 billion[7]. In this it is acknowledged that the factors of production (i.e. labour, intermediation consumption, capital) would be different in irrigated and non-irrigated agriculture. With the information at their disposal the ABS could produce a more accurate estimate IVA for irrigated agriculture. The key point is that a different metric is available.

The value added of the water supply industry is not considered in the report. The water supply industry is not separately identified in the ASNA, hence the value added of this industry is hidden within the aggregation "Electricity, gas, water and waste services" industries. Again, other information could be used to disaggregate this information by those outside of the ABS and a more accurate estimate could be made by the ABS.

With the information at their disposal, the ABS could produce a more accurate estimate and a retrospective timeseries. A key issue with valued added measures of the ABS is that they are national. Estimates could be made for smaller areas, such as the regions included in the BoM National Water Account, but this would require resources. The ABS produces some agricultural data for Natural Resource Management regions which could provide a starting point for aligning ABS data to the regions of National Water Account.

If net economic benefit is taken to be across the whole of the economy, then the economic benefits of water moving from one industry to another (e.g. out of agriculture to other industries) or final consumers (i.e. to households) would need to be considered. In this, the ABS water accounts provide information on both the value and volume of water supplied and used in the economy. Household consumers pay far higher prices for water than other industries. If water suppliers were able to sell more water to households, then the gross and net benefit to the water supply industry would likely increase. The ABS rightly point out that there are differences in water quality supplied to households and industries, so the net measure of IVA would be more appropriate the gross value of water sales. The net change in IVA from a reduction of water use by

[7] (16.4/(60.4 – 9.6)) x 41.4 = 13.4 . Livestock (9.6) is removed for the purpose of this very rough calculation although some production from livestock results from irrigated pasture and water is used by livestock for drinking.

agriculture and an increase in the supply of water to other industries or households by the water supply industry could then be assessed.

There is then the question of the net economic benefits that could flow through use of water by natural assets, such as Ramsar Wetlands. A range of ecosystem services almost certainly flow from these assets and the value of these are either hidden or not recorded in the ASNA. Ecosystem service accounts would help to identify such benefits and could then be considered as part of maximising "net economic returns to the Australian community".

The value of water assets, as represented by the tradeable rights, are not currently identified on the National Balance Sheet of the ANSA. Since changes in the value of water assets would be part of net economic gains (i.e. a capital gain or loss), then it is reasonable that annual information on water assets be recorded in the ANSA. This would also enable the value of the water assets to be compared with other assets on the National Balance Sheet and to what extent changes in water assets are aligned (or not) with changes in the value of other assets.

Objective (e)

> "to improve water security for all uses of Basin water resources"

Environment-economic accounting would have no direct role in achieving this Objective. Indirectly it may contribute by providing a trusted source of information for the different groups of users of water in the Basin and other regions so that they may see their water use in comparison to other uses.

Objective (f)

> "to ensure that the management of the Basin water resources takes into account the broader management of natural resources in the Murray Darling Basin"

An integrated set of SEEA land, water, environmental protection and resource management expenditure, and ecosystem accounts together with traditional SNA account could be used for the broader management of the Basin. The roles of SEEA accounts outlined above for Objectives d(i) to d(iii) of the Act are also relevant here.

Objective (g)

> "to achieve efficient and cost effective water management and administrative practices in relation to Basin water resources"

Accounts for water, environmental protection and resource management expenditure, and ecosystem accounts together with traditional SNA could be used to measure the cost effectiveness of water management. For the water supply industry, aggregate views of environmental protection and resource management expenditures, volumes of water supplied, value of water supplied (all SEEA) and the running and capital costs (SNA) could be combined to provide indicators of change and to set performance benchmarks.

Water accounts and information related to the SNA (input-output tables) can also be used for modelling to predict the impact of current or changed policy on these goals or changes in prices (e.g. of water, agricultural commodities and, going forward, carbon and biodiversity offsets). Computable General Equilibrium modelling has used supply-use water accounts to analyse the impacts of different environmental and economic scenarios (e.g. Wittwer 2012). Similar modelling has been used for a range of purposes by the Productivity Commission (e.g. PC 2012) and other agencies of Australia Government (e.g. DCCE 2012).

Gretton (2013) notes the general benefits and limitations of input-output modelling[8] and also that they can provide a "rich source of information (p. 12). Regional input-output tables enable modelling to occur at subnational levels (e.g. the Murray - Darling Basin) (Lenzen et al. 2017).

Objective (h)

> "to provide for the collection, collation, analysis and dissemination of information about:
>
> (i) Australia's water resources; and
>
> (ii) the use and management of water in Australia.

The use of the SEEA would provide for the integration of the data and accounts required under the Act with other environmental and economic information. The above discussion of Objectives (a) to (g) provide an indication of which accounts could assist and how they could assist. The Annex indicates how accounts may assist water policy in general.

The production of integrated accounts would also force the reconciliation of data from different data providers and would enable data deficiencies to be identified, assessed and acted upon (e.g. resources allocated to the collection of primary data) (Vardon et al. 2018). Over time, regular and on-going of accounts would increase data quality as well as provide a longer time series of information that would be available to analysists and decision makers. This approach would provide information of particular relevance to the management of particular regions. For example, the implementation and review of Murray-Darling Basin Plan. It would also provide information to assist in understanding the impacts of different laws and policies on the economy (e.g. IVA and employment) and the environment (e.g. climate change and biodiversity conservation).

For this to be achieved, the Act and associated Regulations could be updated to reflect the need for broader information to make more integrated policy and management decisions by governments, water suppliers and those industries and communities that rely on water.

5. A process for developing additional information and accounts

The enhancement of the accounts for the purpose the Act would need to be collaborative. Account producers and the implementers of the Act would need to work together to: identify the key issues that could be addressed by enhanced accounting; design a suite of accounts that would address key issues; identify and collect data to populate the accounts, and: test the suitability of the accounts for implementation of the Act. This would likely be an iterative process.

The ABS could, using its existing mandate and experience, collect information and produce a broader set of SEEA accounts. The ABS would need to work closely with other agencies, like BoM and Geoscience Australia, that deal with physical information of water and land respectively.

This work would fit within "Environmental Economic Accounting: A Common National Approach Strategy and Action Plan", (Commonwealth of Australia 2018) prepared by the Interjurisdictional Environmental-Economic Accounting Steering Committee for the Meeting of Environment Ministers.

[8] Computable General Equilibrium modelling is type of input-output modelling

6. Conclusion

The Draft Report notes that "Water accounting is generally providing practical, credible and reliable information, but there is room for improvement" (p. 2 of Executive Summary). I agree entirely with the statement and I hope the Commissioners are able to use the information in this submission to be more specific in their Final NWI Renewal Advice, which might include advice to update the Act and related Regulations to make the water accounts more useful through their integration with other economic and environmental information via the SEEA.

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Annex

From Vardon (2014), page 3.

Ecosystem accounting is relevant to four areas of water policy:

I. For the provision of drinking water and sanitation services to households, the water accounts provide information on the amount of water supplied to households as well as the amount of wastewater generated and either collected by sewerage systems or discharged directly to the environment. Combined with economic information from the water supply industry, water accounts can show the cost of production of water. This could also be extended through modelling to estimate the cost of supply water and sewerage services to a greater proportion of the population. Combined with information from relevant ecosystem accounts, information can be provided on the extent and condition of water-related ecosystems as well as the subsequent quality of ecosystem services provided by them that are related drinking water, sanitation (e.g. water filtration/purification), water availability and disaster risk reduction.

II. For managing water supply and demand the water accounts include information on the total water available and how much is being extracted and used in the economy and by what parts of the economy (e.g. in agriculture, manufacturing and for drinking water). Information on the price of water and the physical use of water can be matched and combined with measures of economic performance to provide indicators of physical water-use intensity and economic productivity and efficiency. Such information can help to inform decisions about investment in water supply infrastructure as well assessing alternative water pricing regimes. In areas with marked temporal fluctuations, this can be combined with information from relevant ecosystem accounts on water regulation (including retention) as an ecosystem service.

III. For improving the condition and services provided by water-related ecosystems, the accounts and in particular the ecosystem accounts, provide much of the biophysical information necessary for tracking changes in extent and condition of water-related ecosystems, as well as for measuring the ecosystem services provided (e.g. water filtration, regulation or retention – see above). The accounts can be used to identify water-related ecosystems declining in quality, the economic and other uses dependant on them and hence allow for the targeting of investment in remediation to achieve the greatest overall benefit. This can include policy tools such as ecosystem conservation and restoration, the payments for ecosystem services or the application of the polluter pays principle.

IV. For adapting to extreme events, the water accounts can show the impacts on economic production, mortality and asset losses of droughts and floods, while a broader set of ecosystem accounts can show the benefits from the services of flood protection, drought mitigation and water flow regulation. Further changes in the condition and services provided by water-related ecosystems can be linked to extreme events and climate change over the longer term.